Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Original) A return fuel temperature control module for use in controlling the temperature of fuel diverted away from an engine and returned to a fuel tank, the return fuel temperature control module comprising

a module housing formed to include an insulator passageway adapted to insulate thermally fuel flowing therethrough, a cooler passageway adapted to cool fuel flowing therethrough and arranged in a parallel flow arrangement with the insulator passageway, and a flow-controller passageway located downstream from the insulator and cooler passageways to receive fuel therefrom, and

flow controller means for controlling flow of fuel through the insulator and cooler passageways to the flow-controller passageway in response to temperature of fuel in the flow-controller passageway so that fuel flows through the insulator passageway to the flow-controller passageway but not through the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is lower than a predetermined lower temperature, flows through the cooler passageway to the flow-controller passageway but not through the insulator passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is higher than a predetermined higher temperature, and flows through both the insulator passageway and the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is between the predetermined lower temperature and the predetermined higher temperature.

2. (Original) The return fuel temperature control module of claim 1, wherein the module housing includes an insulator tube and a cooler tube surrounding the insulator tube so that the insulator tube and the cooler tube are positioned in coaxial relation with one another, the insulator tube is formed to include the insulator passageway, and at least a portion of the cooler passageway is formed between the cooler tube and the insulator tube.

3. (Original) The return fuel temperature control module of claim 2, wherein the cooler tube includes a radially outer surface and a radially inner surface, the module housing includes a plurality of axially extending outer fins coupled to the outer surface and spaced circumferentially apart from one another, the module housing includes a plurality of axially extending inner fins that are coupled to the inner surface, contact the insulator tube, and are spaced circumferentially apart from one another, and each outer fin is radially aligned with one of the inner fins.

4. (Original) The return fuel temperature control module of claim 2, wherein the flow controller means includes a valve and a wax motor including a motor housing positioned in the flow-controller passageway, temperature responsive wax positioned in the motor housing, and a piston extensible from the motor housing to move the valve relative to the module housing in response to expansion of the wax, and the insulator tube, the cooler tube, and the wax motor are coaxial with one another relative to an axis and the piston is arranged to move along the axis to move the valve along the axis.

5. (Original) The return fuel temperature control module of claim 1, wherein the flow controller means includes a valve and a wax motor positioned in the flow-controller passageway to move the valve relative to the module housing.

6. (Original) The return fuel temperature control module of claim 5, wherein the module housing includes a lower temperature valve seat and a higher temperature valve seat, the wax motor is arranged to move the valve between a lower temperature position in which the valve engages the lower temperature valve seat to block flow of fuel from the cooler passageway to the flow-controller passageway and to allow flow of fuel from the insulator passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is below a predetermined lower temperature, a higher temperature position in which the valve engages the higher temperature valve seat to block flow of fuel from the insulator passageway to the flow-controller passageway and to allow flow of fuel from the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is higher than a predetermined higher temperature, and an intermediate temperature position in which the valve is spaced apart from the lower temperature valve seat and the higher temperature valve seat to allow flow of fuel from the insulator passageway and the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is between the predetermined lower temperature and the predetermined higher temperature.

7. (Original) The return fuel temperature control module of claim 6, wherein the wax motor includes a motor housing positioned in the flow-controller passageway, temperature responsive wax positioned in the motor housing, and a piston extensible from the motor housing to move the valve in a first axial direction from the lower temperature valve seat toward the higher temperature valve seat in response to expansion of the wax.

8. (Original) The return fuel temperature control module of claim 7, wherein the flow controller means includes a piston retractor arranged to move the piston in a second axial direction opposite to the first axial direction upon contraction of the wax.

9. (Original) The return fuel temperature control device of claim 7, wherein the flow controller means includes a valve return arranged to move the valve against the

piston toward the lower temperature valve seat in a second axial direction opposite to the first axial direction.

10. (Original) A return fuel temperature control module for use in controlling the temperature of fuel diverted away from an engine and returned to a fuel tank, the return fuel temperature control module comprising

a module housing formed to include an insulator passageway adapted to insulate thermally fuel flowing therethrough, a cooler passageway adapted to cool fuel flowing therethrough and arranged in a parallel flow arrangement with the insulator passageway, and a flow-controller passageway located downstream from the insulator and cooler passageways to receive fuel therefrom, and

a flow controller positioned in the flow-controller passageway and responsive to temperature of fuel in the flow-controller passageway to control flow of fuel from the insulator and cooler passageways to the flow-controller passageway.

11. (Original) The return fuel temperature control module of claim 10, wherein the flow controller includes a wax motor positioned in the flow-controller passageway.

12. (Currently Amended) The return fuel temperature control module of claim 11, wherein the flow controller includes a valve and the wax motor includes a motor housing positioned in the flow-controller passageway, temperature responsive wax positioned in the motor housing, and a piston extensible from the motor housing to move the valve relative to the module housing in response to expansion of the wax.

13. (Original) The return fuel temperature control module of claim 12, wherein the module housing includes a lower temperature valve seat and a higher temperature valve seat and the piston is arranged to move the valve between a lower temperature position in which the valve engages the lower temperature valve seat to block flow of fuel from the cooler passageway to the flow-controller passageway and to allow flow of fuel from the insulator passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is below a predetermined lower temperature, a higher temperature position in which the valve engages the higher temperature valve seat to block flow of fuel from the insulator passageway to the flow-controller passageway and to allow flow of fuel from the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is higher than a predetermined higher temperature, and an intermediate temperature position in which the valve is positioned relative to the lower temperature valve seat and the higher temperature valve seat to allow flow of fuel from the insulator passageway and the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller

passageway is between the predetermined lower temperature and the predetermined higher temperature.

14. (Original) The return fuel temperature control module of claim 13, wherein the lower temperature valve seat is positioned between the higher temperature valve seat and the motor housing.

15. (Original) The return fuel temperature control module of claim 12, wherein the module housing includes a motor mount and the motor housing is coupled to the motor mount.

16. (Original) The return fuel temperature control module of claim 15, wherein the module housing includes an interior wall and the motor mount includes a plurality of flexible fingers that are cantilevered to the interior wall and hold the motor housing therebetween.

17. (Original) The return fuel temperature control module of claim 12, wherein the piston includes a first stem extensible from the motor housing and a piston body engaging the first stem and the valve.

18. (Original) The return fuel temperature control module of claim 17, wherein the piston body includes a stem receiver formed to include a bore receiving the first stem, a second stem extending from the stem receiver through the cooler passageway to the valve, and a flange extending radially outwardly from the stem receiver, and the flow controller includes a piston retractor spring that surrounds the stem receiver and engages the flange to retract the first stem into the motor housing upon contraction of the wax.

19. (Original) The return fuel temperature control module of claim 10, wherein the cooler passageway surrounds the insulator passageway.

20. (Currently Amended) The return fuel temperature control module of claim 10, wherein the flow controller includes a fuel temperature sensor, a valve, and a valve mover, the fuel temperature sensor is positioned in the flow-controller passageway to sense temperature of fuel therein, and the valve mover is coupled to the fuel temperature sensor to move the valve relative to the ~~valve~~ module housing in response to the temperature sensed by the fuel temperature sensor.

21. (Original) The return fuel temperature control module of claim 20, wherein the fuel temperature sensor includes temperature responsive wax.

22. (Original) The return fuel temperature control module of claim 20, wherein module housing includes a lower temperature valve seat and a higher temperature valve seat, the valve mover is arranged to move the valve between a lower temperature position in which the valve engages the lower temperature valve seat to block flow of fuel from the cooler passageway to the flow-controller passageway and to allow flow of fuel from

the insulator passageway to the flow-controller passageway when the fuel temperature sensor senses that the temperature of fuel in the fuel controller passageway is below a predetermined lower temperature, a higher temperature position in which the valve engages the higher temperature valve seat to block flow of fuel from the insulator passageway to the flow-controller passageway and to allow flow of fuel from the cooler passageway to the flow-controller passageway when the fuel temperature sensor senses that the temperature of fuel in the flow-controller passageway is higher than a predetermined higher temperature, and an intermediate temperature position in which the valve is spaced apart from the lower temperature valve seat and the higher temperature valve seat to allow flow of fuel from the insulator passageway and the cooler passageway to the flow-controller passageway when the fuel temperature sensor senses that the temperature of fuel in the flow-controller passageway is between the predetermined lower temperature and the predetermined higher temperature.

23. (Original) The return fuel temperature control module of claim 22, wherein the module housing is formed to include a valve chamber, a sensor chamber, and an intermediate chamber positioned in fluid communication with the valve chamber and the sensor chamber to conduct fuel therebetween, the valve, the lower temperature valve seat, and the higher temperature valve seat are positioned in the valve chamber, and the fuel temperature sensor is positioned in the sensor chamber.

24. (Original) The return fuel temperature control module of claim 23, wherein the module housing includes an insulator tube, a cooler tube surrounding the insulator tube in coaxial relation therewith, and an inlet end cap coupled to the cooler tube and formed to include an inlet aperture to admit fuel into the module housing, the insulator tube is formed to include the insulator passageway, a first portion of the cooler passageway is formed between the cooler tube and the insulator tube, the module housing further includes an outlet end cap formed to include an outlet aperture to discharge fuel from the housing, an outer tube coupled to the cooler tube and the outlet end cap, a first partition wall that is positioned within the outer tube, is spaced apart from the outlet end cap to provide the sensor chamber between the first partition wall and the outlet end cap, and is formed to include a chamber connection aperture interconnecting the intermediate chamber and the sensor chamber for fluid communication therebetween, and first and second module housing bodies coupled to one another to provide the valve chamber, the first module housing body includes the higher temperature valve seat and a second partition wall coupled to the outer tube and spaced apart from the first partition wall to provide the intermediate chamber therebetween, and the second module housing body is positioned in the intermediate chamber between the first and second partition walls, includes the lower temperature valve seat which is located between the higher temperature valve seat and the fuel temperature sensor, and is formed to

include a non-annular second portion of the cooler passageway downstream from the first portion.

25. (Original) The return fuel temperature control module of claim 24, wherein the valve is a ball valve, the fuel temperature sensor includes a motor housing held by flexible fingers coupled to the first partition wall and wax that is positioned in the motor housing and is expandable in response to temperature of fuel in the sensor chamber, the valve mover includes a piston and a valve return spring, the piston is extensible from the motor housing in response to expansion of the wax for axial movement through an aperture formed in the first partition wall and through the second portion of the cooler passageway to move the valve axially from the lower temperature valve seat to the higher temperature valve seat against a force exerted on the piston by a piston retractor spring included in the flow controller and a force exerted on the valve by the valve return spring, the piston retractor spring engages the first partition wall and a flange included in the piston, and the valve return spring engages the valve and a shoulder formed in a coupler sleeve that extends from the second partition wall into the insulator tube and is coupled to the insulator tube.

26. (Original) The return fuel temperature control module of claim 24, wherein the first module housing body includes a coupler sleeve that extends from the second partition wall, is coupled to the second housing body, and is formed to include a chamber connection aperture interconnecting the valve chamber and the intermediate chamber for fluid communication therebetween.

27. (Original) The return fuel temperature control module of claim 24, wherein the second module housing body includes an elbow and a piston sleeve coupled to the elbow, the elbow and the piston sleeve cooperate to provide the second portion of the cooler passageway, and the piston is positioned in the piston sleeve for movement therein.

28. (Original) The return fuel temperature control module of claim 10, wherein the flow controller is arranged to move relative to the module housing between a lower temperature position blocking flow of fuel from the cooler passageway to the flow-controller passageway and allowing flow of fuel from the insulator passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is below a predetermined lower temperature, a higher temperature position blocking flow of fuel from the insulator passageway to the flow-controller passageway and allowing flow of fuel from the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is higher than a predetermined higher temperature, and an intermediate temperature position allowing flow of fuel from the insulator passageway and the cooler passageway to the flow-controller passageway when the temperature of fuel in the

flow-controller passageway is between the predetermined lower temperature and the predetermined higher temperature.

29. (Currently Amended) A return fuel temperature control module for use in controlling the temperature of fuel diverted away from an engine and returned to a fuel tank, the return fuel temperature control module comprising

a module housing formed to include an inlet aperture adapted to admit fuel into the module housing, an outlet aperture adapted to discharge fuel from the module housing, an insulator passageway located downstream from the inlet aperture to receive fuel therefrom and adapted to insulate thermally fuel flowing through the insulator passageway, a cooler passageway located downstream from the inlet aperture in a parallel flow arrangement with the insulator passageway and adapted to cool fuel flowing through the cooler passageway, and a flow-controller passageway extending from the insulator and cooler passageways to the outlet aperture to conduct fuel from the insulator and cooler passageways to the outlet aperture, and

a valve positioned within the module housing, and

a wax motor positioned in the flow-controller passageway and responsive to temperature of fuel in the flow-controller passageway to move the valve relative to the ~~valve~~ module housing to control flow of fuel from the insulator and cooler passageways to the flow-controller passageway to promote compliance of the temperature of fuel discharged from the outlet aperture with predetermined temperature criteria.

30. (Original) The return fuel temperature control module of claim 29, wherein the wax motor includes a motor housing positioned in the flow-controller passageway, temperature responsive wax positioned in the motor housing, and a piston extensible from the motor housing to move the valve relative to the module housing in response to expansion of the wax.

31. (Original) The return fuel temperature control module of claim 30, wherein the module housing includes a first valve seat and a second valve seat, the valve is a ball valve, and the piston engages the ball valve to move the ball valve from the first valve seat to the second valve seat in response to expansion of the wax.

32. (Original) The return fuel temperature control module of claim 29, wherein the module housing includes a lower temperature valve seat and a higher temperature valve seat and the wax motor is arranged to move the valve between a lower temperature position in which the valve engages the lower temperature valve seat to block flow of fuel from the cooler passageway to the flow-controller passageway and to allow flow of fuel from the insulator passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is below a predetermined lower

temperature, a higher temperature position in which the valve engages the higher temperature valve seat to block flow of fuel from the insulator passageway to the flow-controller passageway and to allow flow of fuel from the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is higher than a predetermined higher temperature, and an intermediate temperature position in which the valve is positioned relative to the lower temperature valve seat and the higher temperature valve seat to allow flow of fuel from the insulator passageway and the cooler passageway to the flow-controller passageway when the temperature of fuel in the flow-controller passageway is between the predetermined lower temperature and the predetermined higher temperature.

33. (Original) The return fuel temperature control module of claim 29, wherein the module housing includes an insulator tube and a cooler tube surrounding the insulator tube so that the insulator tube and the cooler tube are positioned in coaxial relation with one another, the insulator tube is formed to include the insulator passageway, and the cooler tube and the insulator tube cooperate to form at least a portion of the cooler passageway therebetween.

34. (Original) The return fuel temperature control module of claim 33, wherein the module housing includes a plurality of outer fins coupled to an outer surface included in the cooler tube.

35. (Original) The return fuel temperature control module of claim 33, wherein the module housing includes a plurality of inner fins coupled to an inner surface included in the cooler tube.

36. (Original) The return fuel temperature control module of claim 33, wherein the insulator tube is made of nylon and the cooler tube is made of aluminum.